Transatlantic Meeting
15 & 16 Feb 2006

Aviation Maintenance Data Interchange

Sponsored by the OSD ATL UID Director and managed by the DLA, Logistics Enterprise Services Program Office

Agenda

- ELITE Primary Goal
- Technical Approach
- Architecture
- Operational Description
- ISO 10303 AP239 PLCS Aviation Maintenance DEX Overview
- DEX Development Status
- UID Coverage in DEX
- Current ELITE schedule
- Transformation Server Mapping: MetaMatrix
- Future ELITE Initiatives – Spirals
- Summary

Primary Goal

- Weapon Systems Life Cycle Management (WSLM) Interoperability
- Materiel Supply Service Management (MSSM) Visibility
  - Aviation Maintenance Visibility through Product Life Cycle Support (PLCS)

Increased Responsiveness to Warfighters

Model-Driven Information Integration

- Problem
  - Implementing new initiatives , i.e., UID in the legacy environment
  - COTS vendors provide proprietary models now that result in brittle and costly interfaces
- Solution
  - COTS data transformation services leveraging open interoperability standards, i.e. PLCS
  - Aviation Maintenance Data Interchange project demonstrates how this work

elite
Electronic Logistics Information Trading Exchange

Why do it this way?

- Most effective way to implement UID in a legacy environment
- PLCS International Standard provides a framework for vendor-neutral data transformation

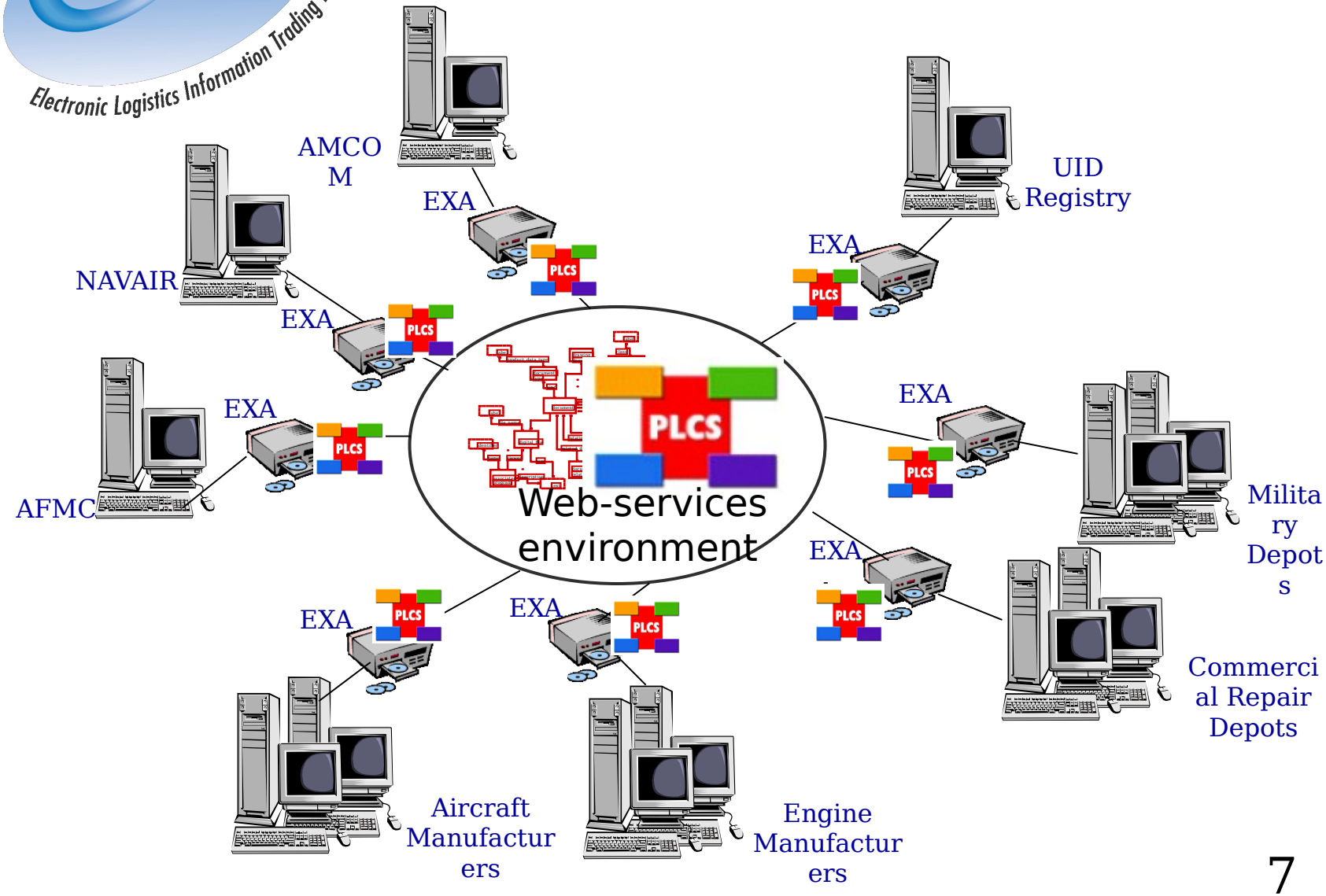
Don't have to wait for standards maturity to implement and become operational now!

- PLCS is different from other standards-oriented solutions because it is extensible to a range of lifecycle events
  - Business Concepts
  - Use Cases
  - Business Processes
- Combined with advanced data exchange technology enables immediate operational implementat

Technical Approach

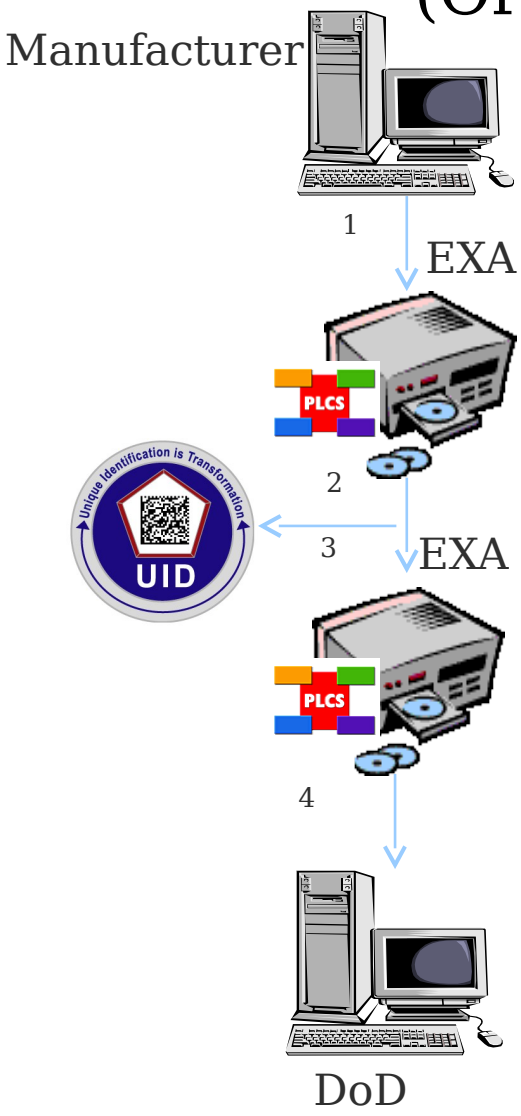
- Develop web cognizant data standards
  - ISO 10303 AP239 PLCS Aviation Maintenance DEX
- Install exchange servers located with legacy systems
  - Use existing servers where possible
  - Houses COTS product and database transaction management
- Utilize COTS and custom software (as needed) for data transformation

Architecture



Operational Description – Example:

CM Data for a New Aircraft/Engine (Originating from the Manufacturer)



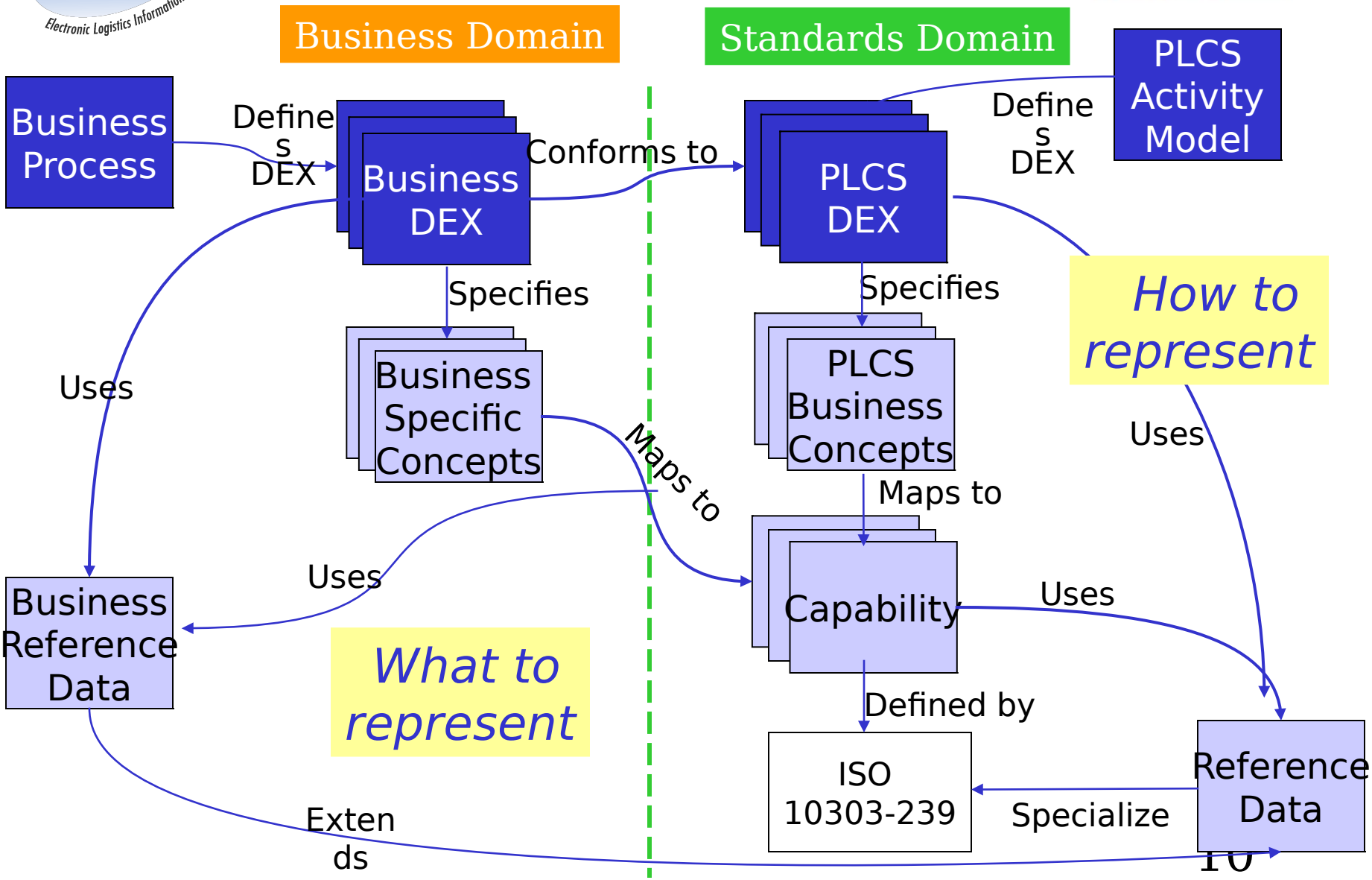
- Step 1:
  - A Transaction Set (TS) is transmitted to the EXA from the Manufacturer as a result of shipping a new aircraft/engine to DoD.
- Step 2:
  - TS from the Manufacturer's EXA is transformed into the ISO 10303-AP239 PLCS Compliant DEX Data Set and transmitted to the DoD EXA Server
- Step 3:
  - Populate the UID Registry.
- Step 4:
  - DoD EXA receives the PLCS Compliant DEX Data Set, transforms the data into legacy acceptable TS, and populates the appropriate fields in the DoD Server.

Product Life Cycle Support (PLCS)

Capabilities enabled by PLCS – ISO 10303 AP 239

- Product Description
  - Capability to define product requirements and configuration, including relationships between parts and assemblies in multiple product structures (as-designed, as-built, as-maintained)
- Work Management
  - Capability to request, define, justify, approve, schedule and capture feedback on work (activities) and related resources.
- Property, State and Behavior
  - Capability that describes and captures feedback on product properties, operating states, behaviour and usage
- Support Solution and Environment
  - Capability to define the necessary support for a given set of products in a specified environment and to define support opportunity, facilities, personnel and organizations

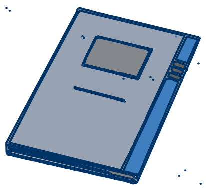
PLCS DEX Overview --What and Hov



PLCS Process

Business Information Objects (BIO)

- **Army PAM 738-751**
- **Navy 4790**
- **Air Force**
- **Sikorsky**
- **Boeing**
- **Rolls Ro**



PLCS Reference Model in EXPRESS

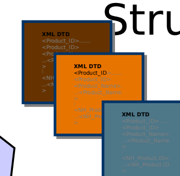
Data Exchange Business Rules

Mapping of Source Data to PLCS

Seq #	Field Name	PDI Specification	Mapping Specification
1	*Part Material design enterprise type code*	group.name	{[group_assignment on organization role.name = 'enterprise type code'] [organization_assignment on product organization_role.name = 'designer']}
2	*Part/Matrial design enterprise identifier*	identification_assignment.id	{[identification_assignment on organization, organization => cage identification_role.name = 'com cage', 'gov cage'] [organization_assignment on product organization_role.name = 'designer']}
3	*Part/Material Identifier*	product.id	
4	*Material identification parameter list*	product.id	product => material
5	*Part/Material name*	product.name	
6	*NSN*	identification_assignment.id	identification_assignment on product identification_role.name = 'NSN'
7	*Product tracking-basd source code (13TRK1)*	group.name	group_assignment on product group_role.name = 'tracking base source code' {group.name = 'D', 'drawing', 'C', 'configuration item', 'U', 'Specification', 'S', 'standard document', 'P', 'product', 'M', 'material'}
8	*Product-tracking base-identifier*	group.id	group_assignment on product group_role.name = 'tracking base source code'
9	*Defining document identifier and type code*	[document.id] [document_kind.name]	product_definition_with_associated_document.documents [i] -> document or drawing_document
10	*can be substituted for/replaces part/material source, or has company stock number assigned by*	organization.id	{is the org that has orgnaization_assignment on the product that is the related_product_definition in product_definition_relatioship where the relationship.name = 'substitute'
11	*can be substituted for/replaces part/material identifier, or is company stock number of*	product.id	{is the related_product_definition in product_definition_relatioship where the relationship.name = 'substitute'
12	*can be substituted for/replaces part/material identification parameter list*	product.id	{is the product => material and the related_product_definition in product_definition_relatioship where the relationship.name = 'substitute'

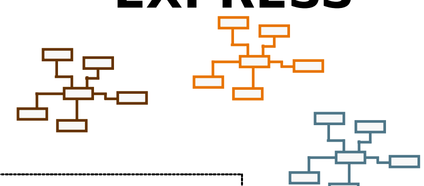
PLCS Application Transaction Sets in XML

Product Identification Product Structure



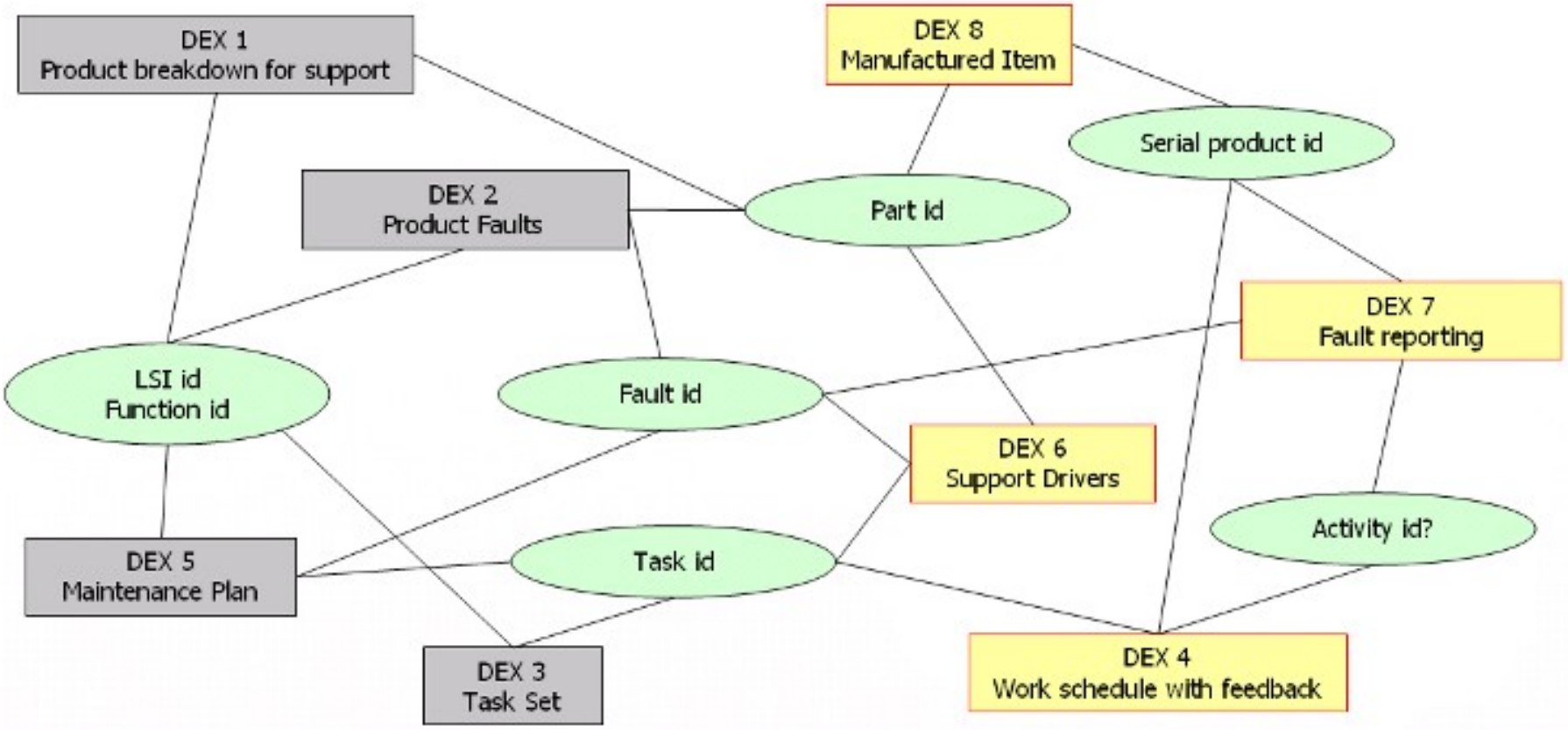
ISO 10303 Part 28

PLCS (DEX) Context/Application Model in EXPRESS



Analysis **Auto Tools**

DEX specifications



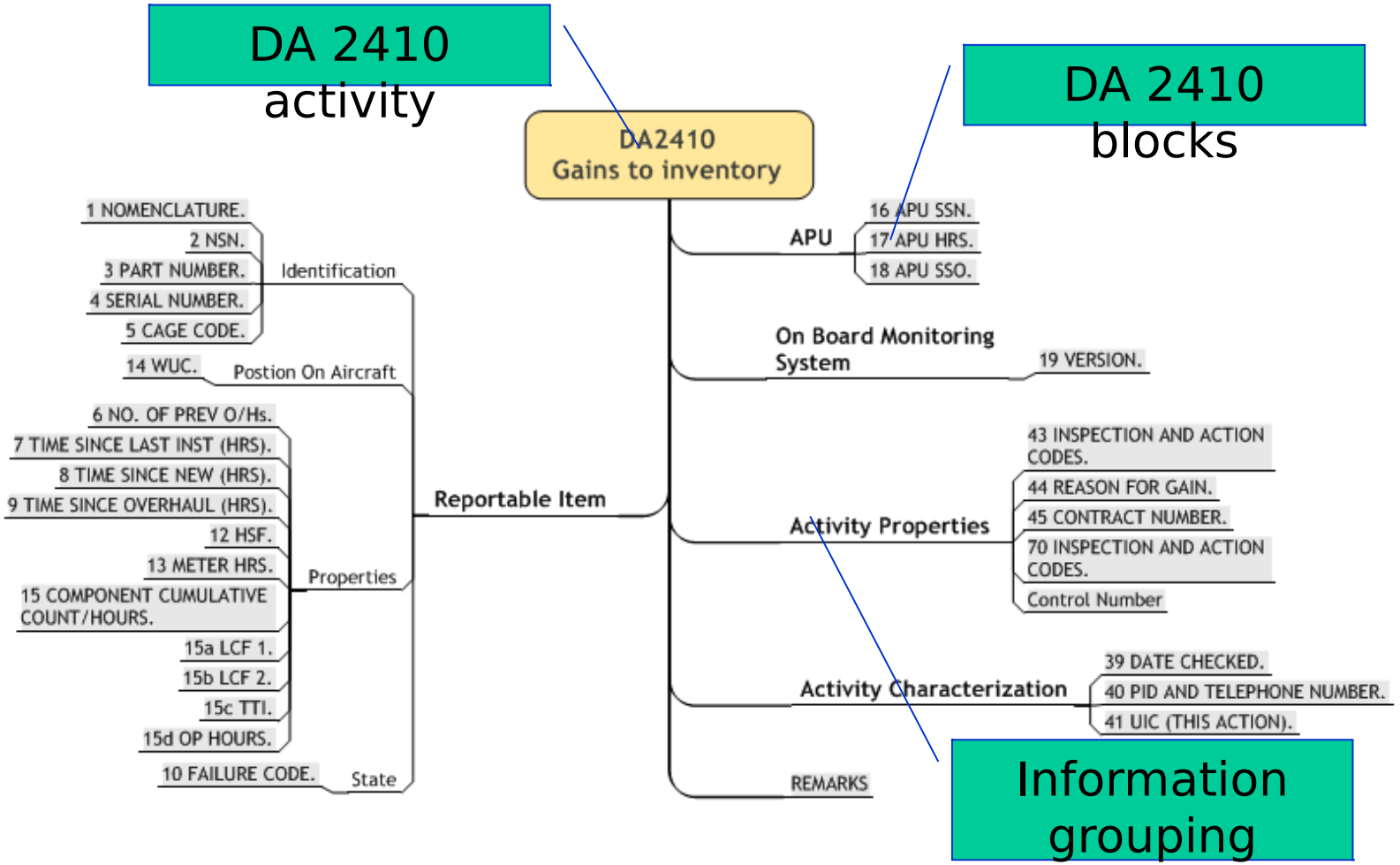
Aviation Maintenance DEX

- Focused on DA 2410 form
  - Provided a good way of scoping what is to be represented
  - Used PAM 738-751
- This provided a good basis for extending into a more generic DEX
  - The generic DEX supports broader scope

Development Process

- Using PAM 738-751 (DA 2410 form)
- Identified “chunks” of information to be exchanged

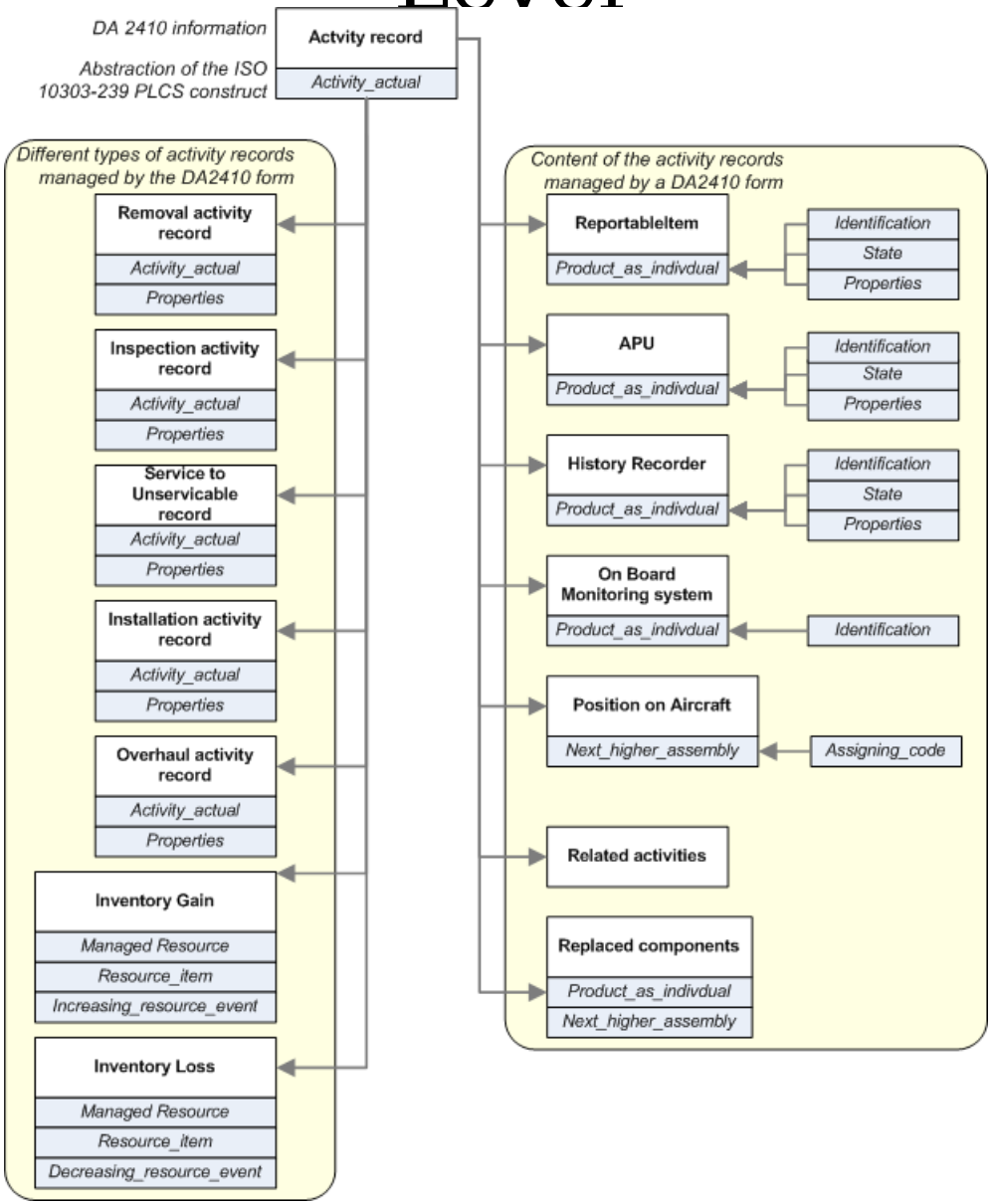
Analysis of Information to be Exchanged



Development Process

- Using PAM 738-751 (DA 2410 form)
- Identified “chunks” of information to be exchanged
- Identified how to represent the information in PLCS
  - Capabilities, Templates, Reference Data

How to Represent in PLCS – High Level



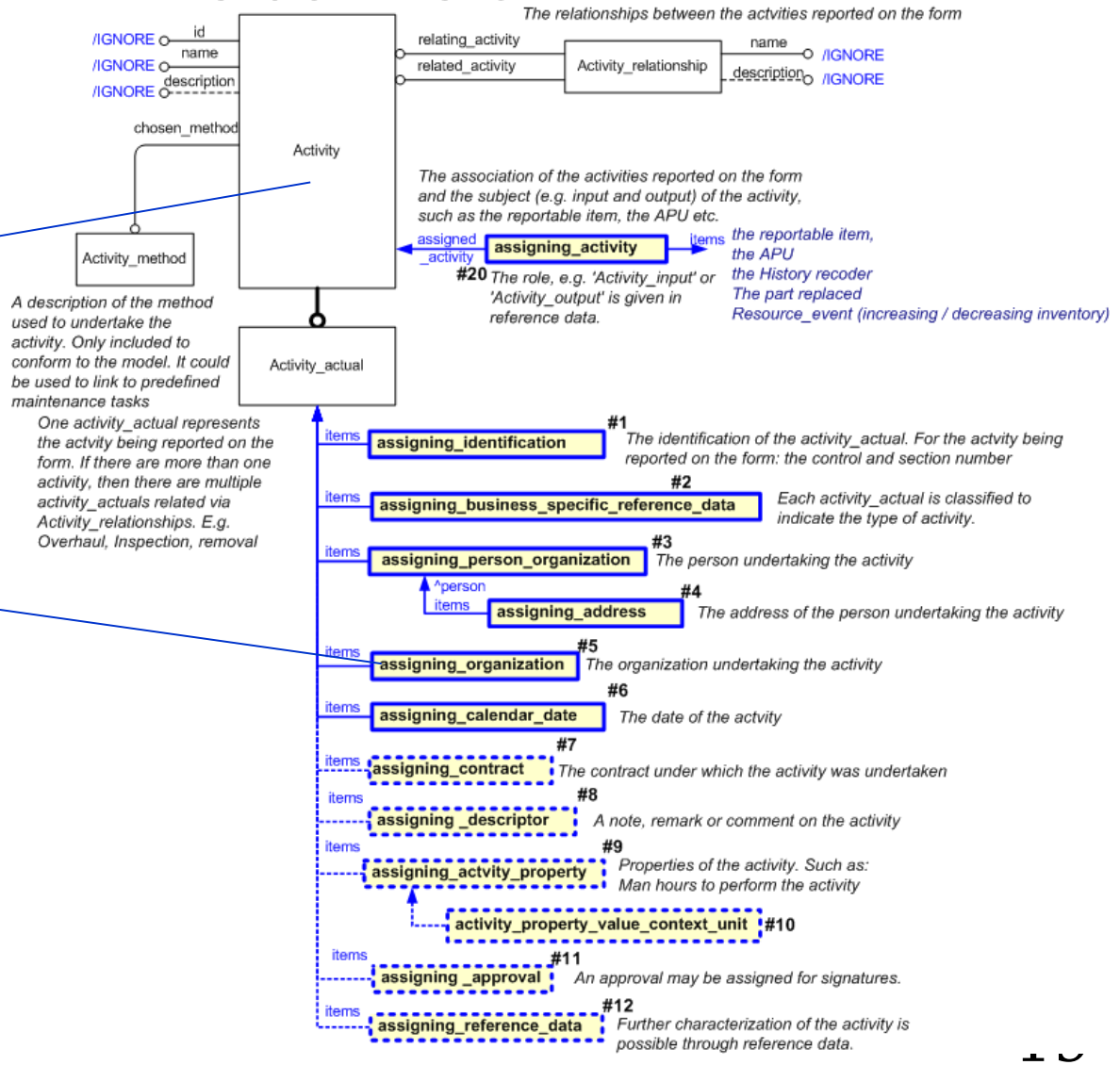
Development Process

- Using PAM 738-751 (DA 2410 form)
- Identified “chunks” of information to be exchanged
- Identified how to represent the information in PLCS
  - Capabilities, Templates, Reference Data
- Developed
  - Business Concept, Templates, Reference Data

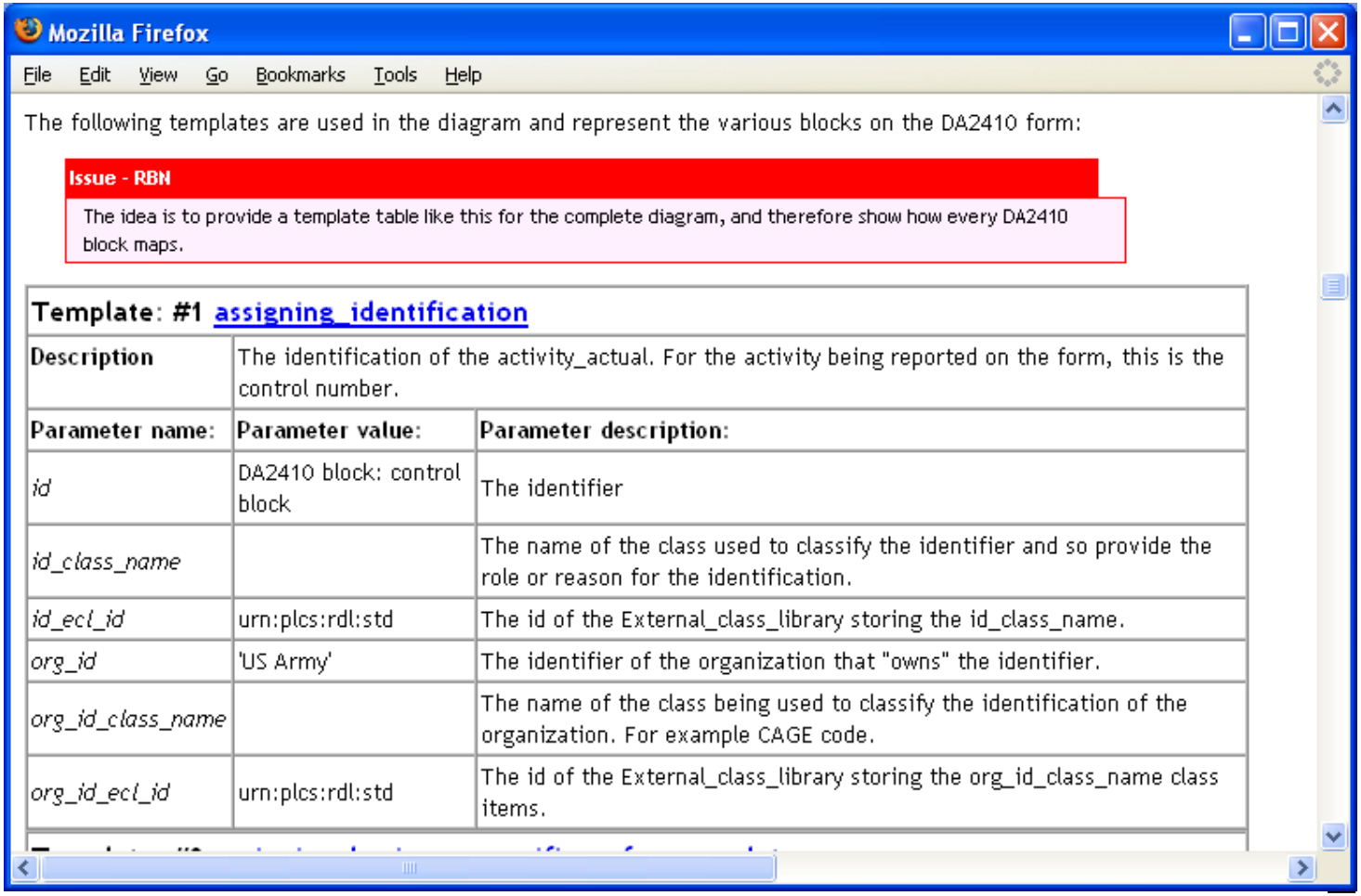
How to Represent in PLCS Detailed

EXPRESS entity

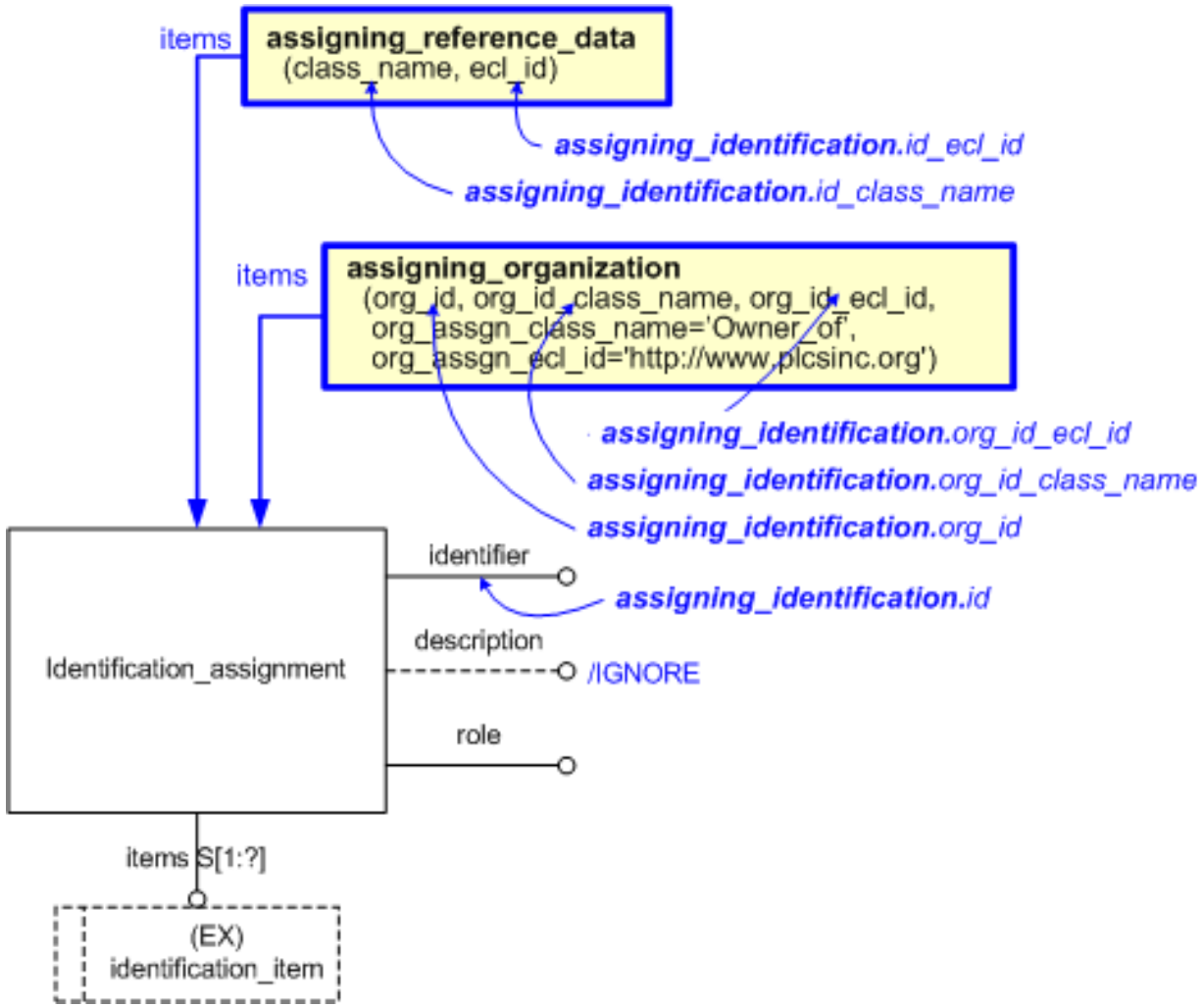
Template



Use of Templates – DA2410Mapping



A Template


items
assigning_reference_data
(class_name, ecl_id)
assigning_identification.id_ecl_id
assigning_identification.id_class_name
items
assigning_organization
(org_id, org_id_class_name, org_id_ecl_id,
org_assgn_class_name='Owner_of',
org_assgn_ecl_id='http://www.plcsinc.org')
assigning_identification.org_id_ecl_id
assigning_identification.org_id_class_name
assigning_identification.org_id
identifier
assigning_identification.id
description
/IGNORE
role
Identification_assignment
items S[1:?]
(EX)
identification_item

Aviation DEX Templates

- A specification of "How"
  - **activity_property_value**
  - **assigning_activity**
  - **assigning_activity_property**
  - **assigning_address**
  - **assigning_approval**
  - **assigning_approval_person**
  - **assigning_asserted_state**
  - **assigning_assessed_state**
  - **assigning_calendar_date**
  - **assigning_contract**
  - **assigning_dated_effectivity**
  - **assigning_descriptor**
  - **assigning_person_in_organization**
  - **assigning_product_property**
  - **assigning_time**
  - **product_property_value**
  - **representing_count**
  - **representing_date_time**
  - **representing_dated_effectivity**
  - **representing_quantity**

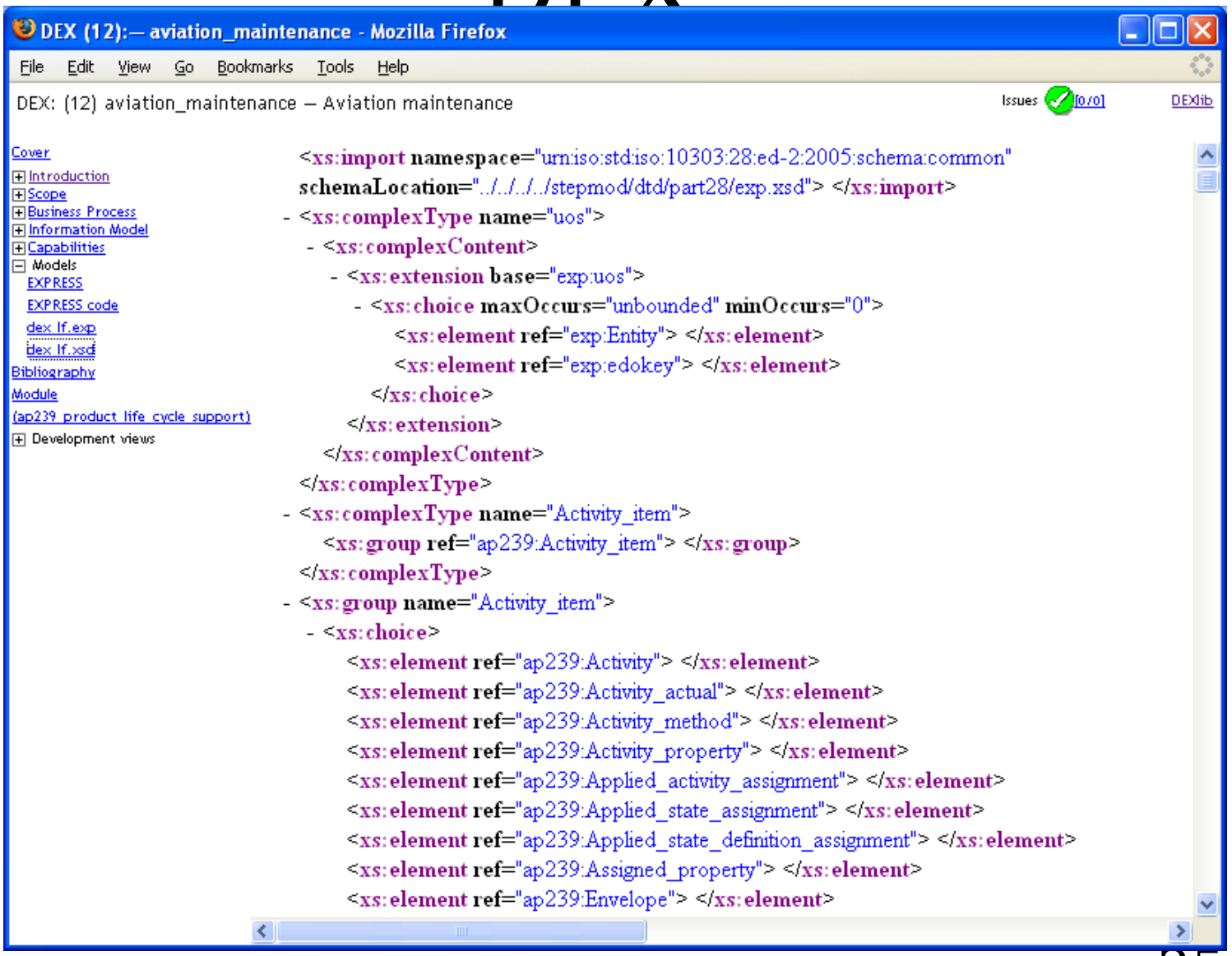
Dependent Capabilities

- representing_properties_numerically
- representing_activity
- assigning_process_properties
- representing_person_organization
- assigning_approvals
- representing_state_observed
- representing_contract
- assigning_effectivity
- assigning_descriptor
- assigning_product_properties
- assigning_date_time
- representing_value_with_unit
- assigning_date_time

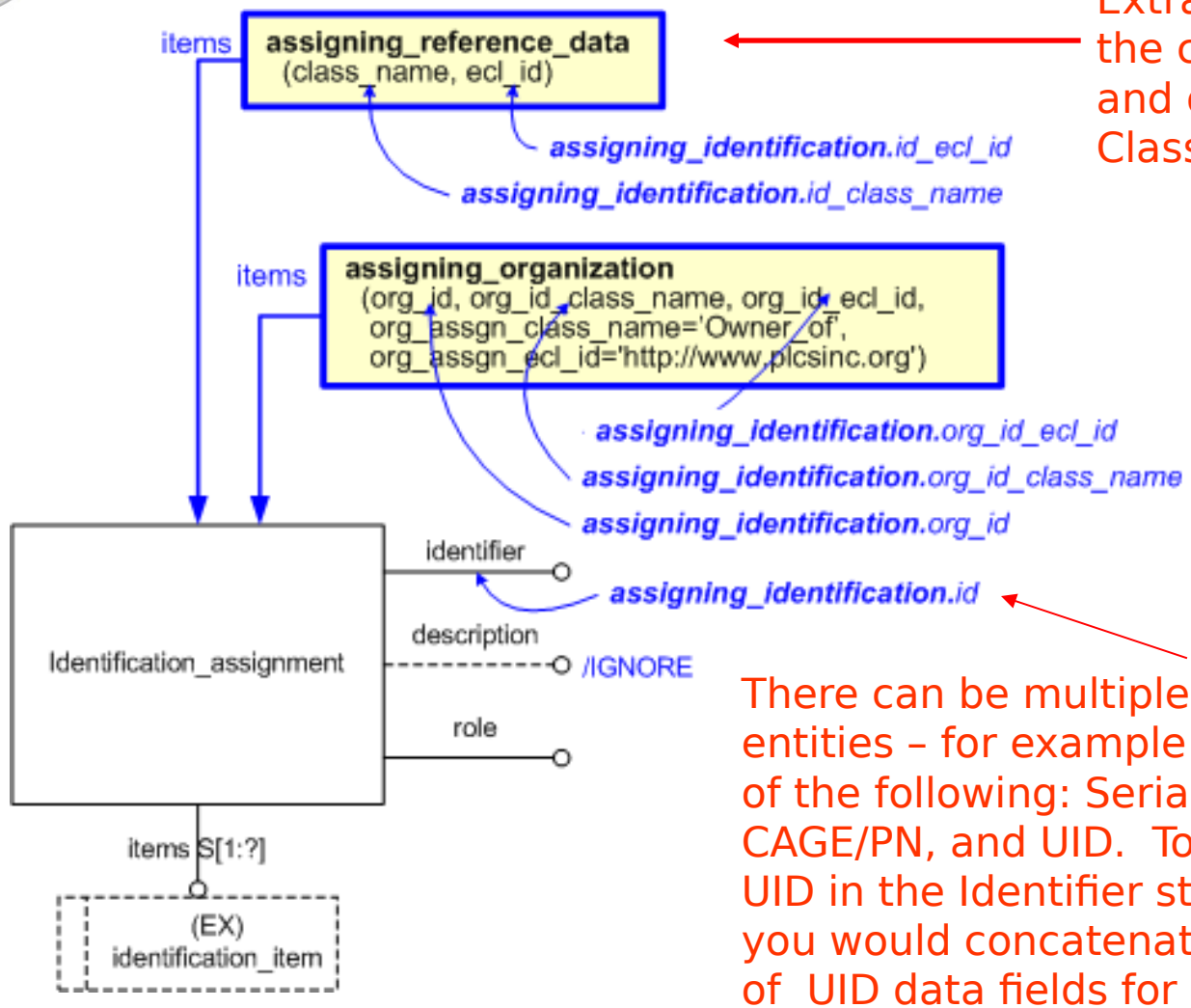
Outcome

- Specification
  - “How to” represent the DA 2410 information using ISO 10303-239
  - “What” to represent in an exchange
  - Templates ensure that same approach is used in other DEXs
    - Began with PAM 738-751 Reference Data
    - Utilized joint service data element spreadsheet to enable generic Aviation Maintenance DEX

The Aviation Maintenance DEX



UID in the DEX Template

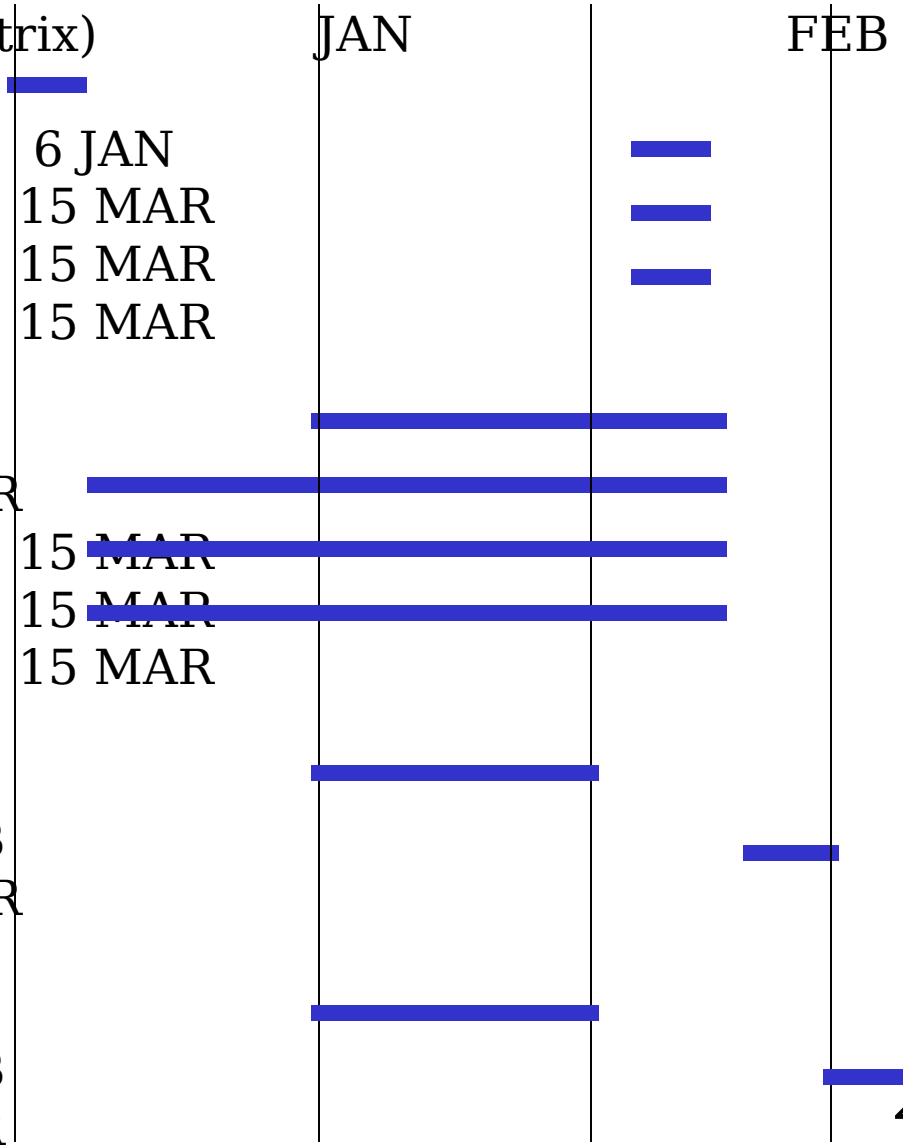


Extract the UID by the classification and organization. Class = UID

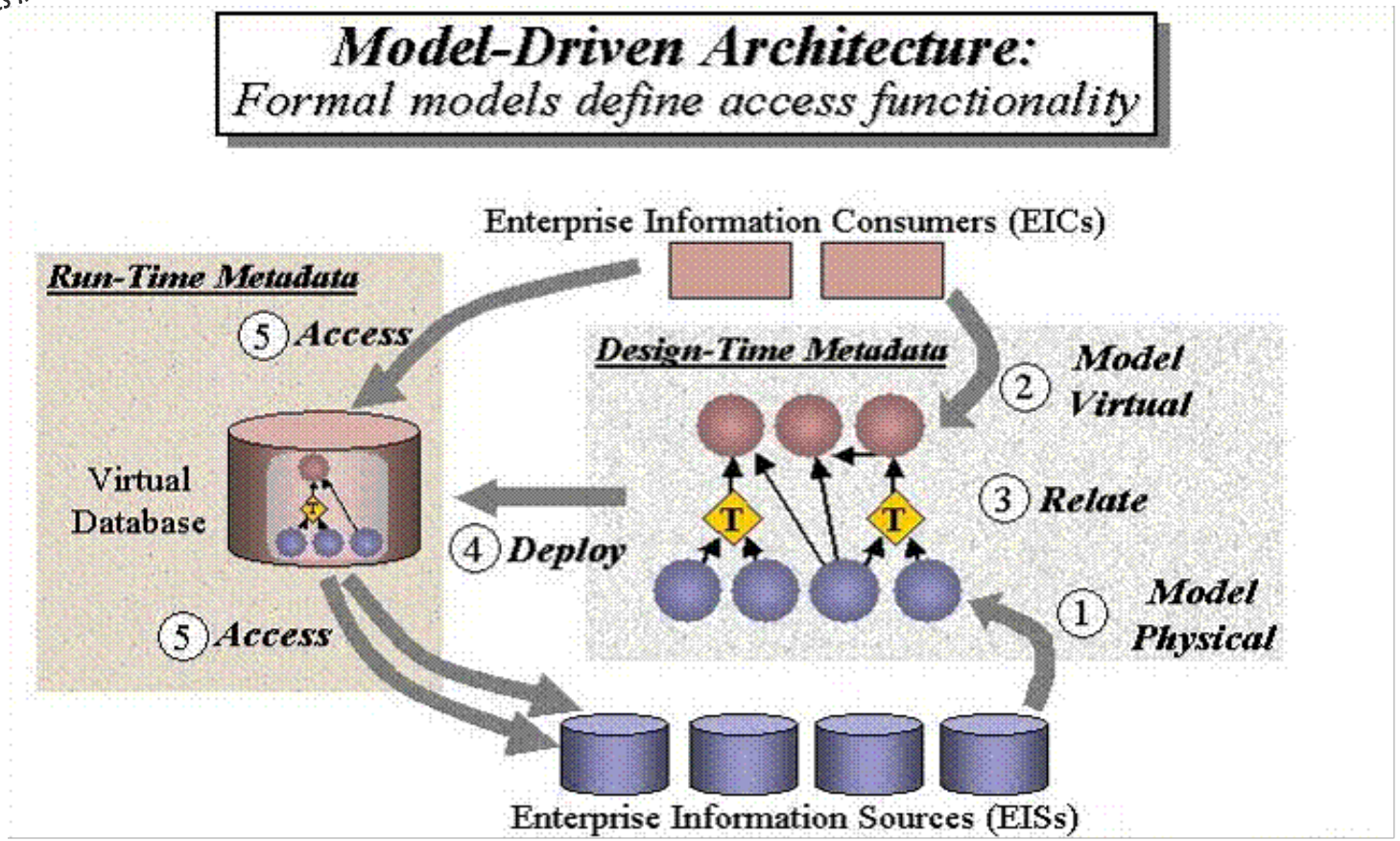
There can be multiple identifier entities – for example one for each of the following: Serial Number, CAGE/PN, and UID. To store the UID in the Identifier string entity you would concatenate all pieces of UID data fields for construct 1 or 2.

ELITE Schedule

Task	Milestone
Software installation (MetaMatrix)	
ManTech	6 JAN
NAVAIR	15 MAR
Sikorsky	15 MAR
AMCOM	15 MAR
Database Mapping	
PLCS DEX	15 MAR
NAVAIR	15 MAR
Sikorsky	15 MAR
AMCOM	15 MAR
System Test and Validation	
Test Plan dev	28 FEB
System Test	28 MAR
Operational Validation	
Test plan dev	28 FEB
Op val	16 APR

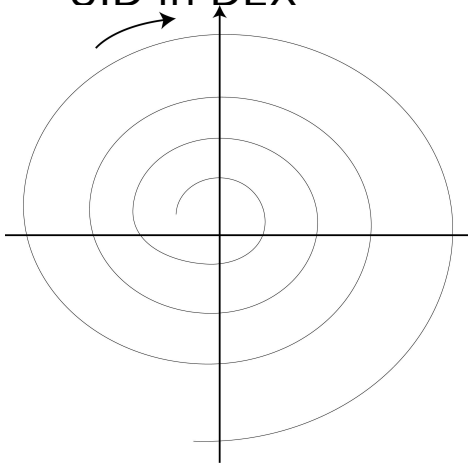


Transformation Server Mapping: MetaMatrix



Materiel Visibility Spiral Development

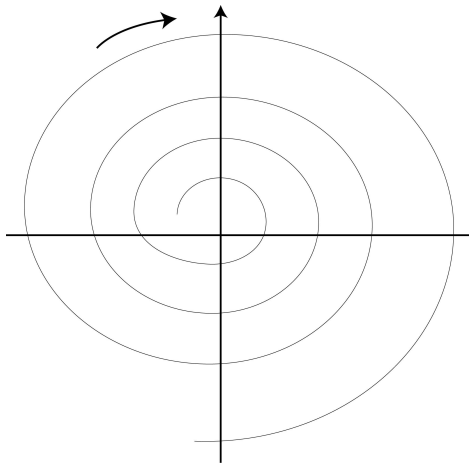
- Spiral 1 – Concept Exploration and Demonstration
  - Sikorsky to Army, Sikorsky to Navy, Navy to Army
  - PLCS DEX
  - UID in DEX



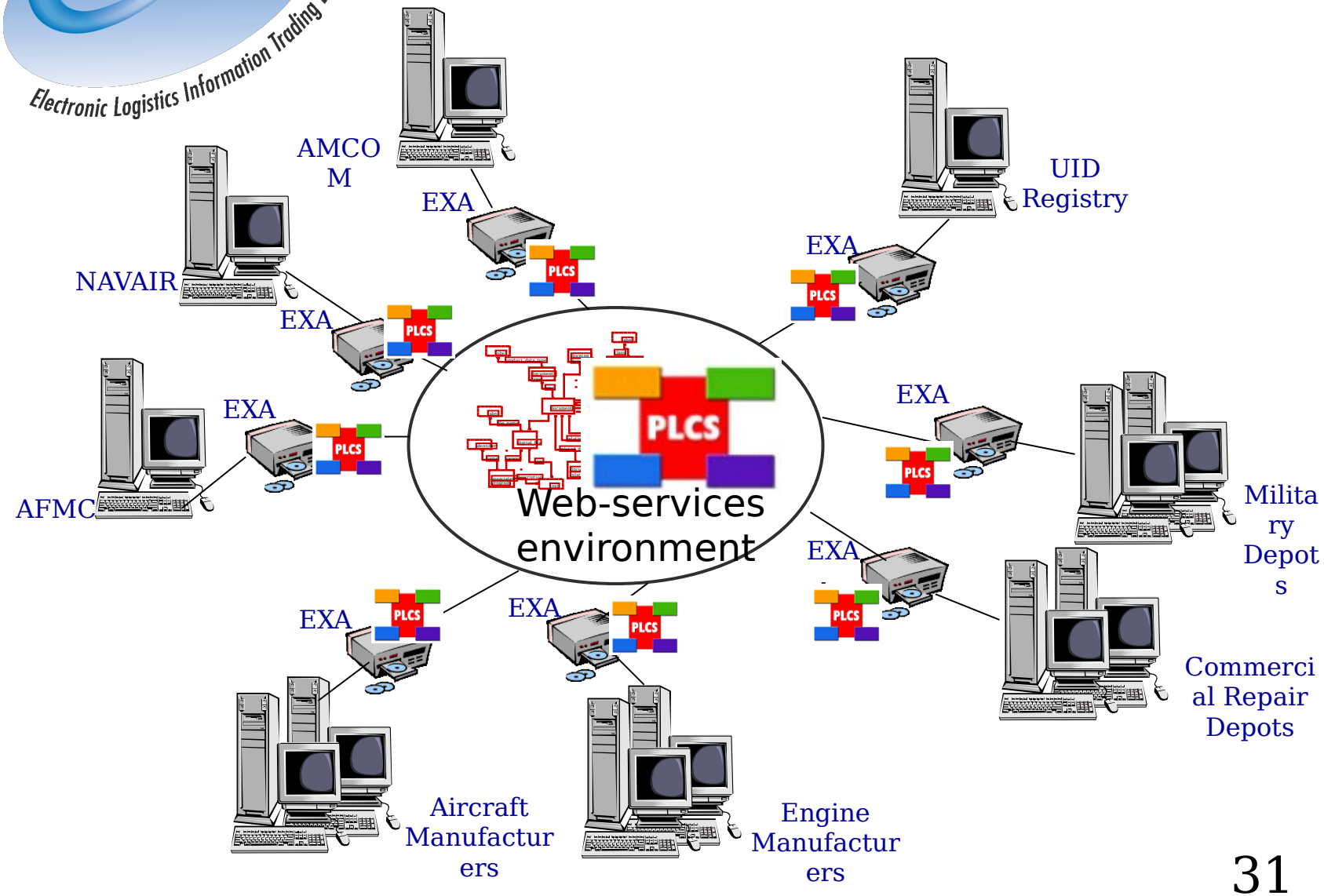
- Spiral 2 – Initial Operation and Evaluation
  - More industry joint enterprise network
  - GEX provides advanced UID processing
  - ELITE / PLCS advancement (DOD business objects technical training)
  - Air Force joins enterprise network
  - ELITE/PLCS outreach (AIA)
  - Extend Army-Navy network
  - DBO to DEX conversion process

Materiel Visibility Spiral Development

- Spiral 3 – Full Operational Capabilities
  - Rules of the enterprise
  - Small / Medium Enterprise – Participation
  - Synchronization of UID / RFID
    - Predictive
    - CMIS
    - Tech data
- Spiral 4 – Expansion and Consolidation
  - Tech data UID



Architecture



Summary

- ELITE supports development of the Materiel Visibility Initiative
  - Spiral 1 – Concept Exploration and Demonstration nearing completion
  - Ready to accept challenges of Spiral 2 – extend the network
- The Keys for success:
  - PLCS framework for vendor-neutral data transformation
  - COTS data transformation services
- The Aviation DEX supports UID implementation
- The Aviation DEX is based on an extensible business model that will support other weapon systems and their government and commercial maintenance managers.
- PLCS and DEX remain evolutionary
  - Template design and approval ongoing
  - DEX submission to Technical Committee review and acceptance within OASIS
  - Will need business rules for future use and adaptation to new DEX versions

Don't have to wait for standards maturity to implement and become operational now!